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A LOW PASS FILTER

For Radio and Phono Use.

(Taken from an article by G.M. Kosolapoff published in "Radio")

With the advent of high fidelity equipment for radio reception and phonograph reproduction the constructor often finds himself facing the limitations imposed upon the sound reproduction. Few people wish to have separate tuners and amplifiers for high fidelity and normal broadcast uses but at the same time most of us would like to squeeze as much fidelity as possible out of a given signal. Phonograph reproduction is up against a similar problem. There are various types and kinds of discs in use which vary quite a bit in the noise level.

Simple RF tuners having wide enough band pass for high fidelity are not particularly pleasant to listen to on regular B.C. stations, due to interchannel whistle and a certain amount of chatter.

In regard to phonograph reproduction we now have high fidelity pick-ups which have good response beyond 10,000 cycles. They are excellent for low noise level discs, but frequently one wishes to run the regular shellac records; and then the trouble starts. There are some people who do not mind hearing a great deal of extraneous noise in order to pick out of it all a certain amount of higher harmonics. However, there are more people who do not feel that this extra "hash" adds to the fidelity of reproduction.

An ordinary tone control can be used to eliminate the difficulty in both of these cases. However, the ordinary tone control has a rather gradual frequency cut-off, so that in order to remove, say, the 10KC whistle, or some particularly objectionable record noise, the middle register response suffers quite a bit.

Now a low pass filter has a sharp frequency cut-off relatively speaking. Insertion of such a filter into the audio

system can cure most of the trouble mentioned above, provided the cut-off is made at the proper point for the desired application.

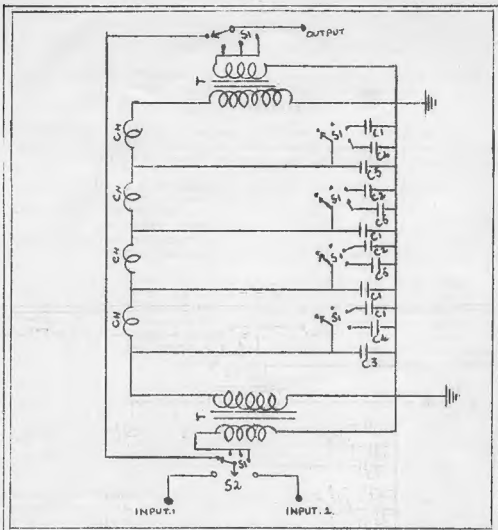
In order to have one unit which could be readily used for a number of applications the writer constructed an inexpensive and simple audio filter which has variable cut-off in three steps, so designed as to make the system usable for high fidelity application, as well as for bc listening and phone reproduction.

The filter is a three section job, which gives plenty of attenuation of the undesirable frequencies. The three cut-off frequencies are 8200, 6000 and 5000 cycles. The unit has an impedance in the neighbourhood of 500 ohms and must be coupled at both ends with matching transformers. However, since the transformers are in use only when the filter itself is operative there is no need to use expensive transformers of the extended frequency range type. A shorting lead cuts out the entire unit when high fidelity response is desired. The circuit as shown includes the entire unit including the phone-radio switch.

In its radio application the filter is usually set at 8200 which eliminates interchannel whistles as well as practically all of the audio "hash." When the interference is at high level lower settings are of great use. In its phone application the gadget is probably of most use on ordinary shellac discs, especially on the older ones.

It was quite amazing how well some really ancient discs sounded when they were used with the filter in operation. The filter unit itself provides a sharp and steep upper limit to the high frequency response, where practically all of the audible "hash" is located, so that by setting this threshold at the proper frequency the offending noises are reduced to inaudibility.

There is no obvious reason why more cut-off steps may not be used, but the three given here are found to be quite sufficient for the normal use.



C1., 0.05 mfd
 C2., 0.1 mfd
 C3., 0.025mfd
 C4., 0.02 mfd
 C5., 0.04 mfd

CH., 30 millihenry
 chokes
 T... 500 ohm line to
 grid transformers
 S1.. 6 gang, 6 position
 non-shorting switch
 S2.. rotary S.P.D.T. switch

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- SOME NOTES ON FIDELITY -

Simple design suggestions for A. F. Amplifiers from
an article by W9SDG published in QST

The designer of an audio frequency amplifier approaches his problem with three requisites in mind---sufficient gain, minimum wave distortion, and correct frequency response.

Getting sufficient gain is probably the least of his troubles, but minimizing wave distortion is not quite so simple. The usual procedure here is to follow the tube manufacturers recommendations as to electrode voltages, load resistances, and signal levels. Even harmonic distortion may be practically eliminated by using push-pull stages.

Push-pull circuits offer so many advantages that it often pays to use all push-pull stages in an amplifier. The use of push-pull allows savings in power supply filter and in decoupling circuits. Another advantage is that the output transformer of a push-pull stage does not suffer from D.C. saturation and consequently a smaller transformer with improved frequency response may be used.

In any resistance-capacity coupled amplifier there is a plate load resistance, a coupling condenser and a grid leak. The correct value of load resistance is taken from a tube data chart. In selecting values for the coupling condenser and grid leak it should be remembered that an increase in the value of either will extend the response range of the stage in the low frequency region.

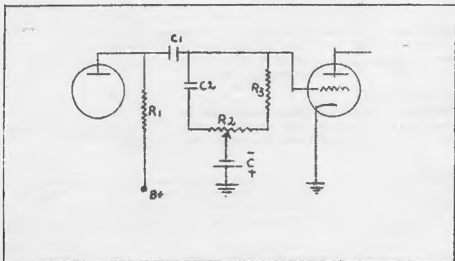
An RC product of 0.01, where R is in megohms and C in mfd, will give a substantially flat response curve down to 30 cycles. For example a 0.01 condenser and a 1 meg leak could be used or a 0.002 mfd condenser and a 5 megohm leak. The latter combination has the advantage that a relatively low cost mica condenser can be used and these are also less prone to leakage and break down than say a 0.01 mfd paper condenser. Another advantage of using the high value grid leak is that bass response may be attenuated simply by switching in a lower resistance, say 1 megohm.

Frequencies above 5000 cycles are not so easily controlled on paper. However, the input impedance of conventional tubes is in the megohms over the whole audio range. So it should be possible to build a satisfactory wide-band amplifier without inverse feedback or other compensation.

Uncontrolled feedback is our worst enemy but a logical lay-out of parts should minimize valleys and peaks in the response curve below 5000 cycles. Another thing to remember is that electrolytic condensers are not very efficient at 5KC and should be shunted by small paper condensers.

The zero-audio-potential elements of tubes used in single ended circuits must be by-passed to ground. Perhaps the most common destroyer of both low and high frequency response is the cathode bypass condenser. For good response down to 30 cycles this should be at least 5 mfd for by passing 2000 or 3000 ohms and at least 25 mfd for by-passing 400 ohms or so. A satisfactory screen by-pass capacity is 0.1 mfd.

A bass attenuator has already been mentioned and treble frequencies can be attenuated by a small condenser shunting the load resistance or the grid resistor. The circuit shown gives a form of tone control which can be used for full bass or treble attenuation using the one control.



C1....0.002 mfd

R1....0.25 meg

C2....250 mmfd

R2....5 meg potentiometer

R3.... 1 meg

D I V I S I O N A L N O T E S .

- V I C T O R I A N D I V I S I O N -

W A N T E D

I N S T R U C T O R S F O R M O R S E C O D E C L A S S E S .

No special qualifications required. If you can spare Monday or Thursday night and send at 15 - 20 W.P.M. please get in touch with the Class Manager, Mr. H. M. Stevens. V.K.370.

3YL... has recently accepted a position as instructress at the W.I.A. classes -- results so far most satisfactory to both 3YL and the students.

3RN... was heard at the last meeting discussing with Bert Burdekin the why's and wherefore's of constructing an electric clock of the grandfather type. We wonder just what the outcome will be.

3NY... recently returned from holidays to find himself on the relieving staff -- and what is worse the unhappy possessor of a crop of boils -- Why take holidays???

3JO... reports that the morse class attendances are improving but more instructors are badly needed. All Herb has to do now is take his bed into the Institute -- Herb was elected Chairman of Council, at the last Council meeting.

3UM... had his picture adorning the centre page of one of Melbourne's dailys recently. Congratulations Bill on your marriage...all the best.

3WY... spent some time recently at the Law Courts as the result of being called to serve on the jury. We hope to hear more about it in the near future.

3YK... is from a recent letter from him, now in Singapore. Now has Commissioned rank..and reading between the lines has had some experiences. Let's hear from you again O.M.

Ralph Clarkson...has been trying out the HMV anti-static antenna and having excellent results, and definitely reduces noise. Short wave reception at Sale is far better than at Brunswick.

Mr. Ridgeway... a new member was present at the last meeting. He was one of the ones who got their AQGP too late.

32K... turned up in VIM a couple of weeks ago. We had first hand information of Jim's fighting capabilities. For further information apply to Fitz.????

3HX... seems to remember the fight of 32K being one of the interested spectators only a few feet away..Did I hear anyone say anything about picnics in the rain. They are not so bad when you've got a car.

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-- N.S.W. DIVISION --

By VK2TI

The August General Meeting of the Division took place on the 21st ult., and the roll up was the best for some considerable time.

The Chairman, 2RA, in declaring the meeting open extended a welcome to Wilf Harris VK2ALF who recently returned from a "pleasure" cruise upon one of His Majesty's Australian Ships. This tour embraced such places as Cape Matapan, Greece, Suda Bay and Alexandria. Later on in the evening Wilf gave Members a summary of his experiences and the way in which his ship used to evade the dive bombers raised the query as to whether she was an outboard or a cruiser!

Lieutenant D. B. Knock is still an inmate of Prince of Wales' Hospital Randwick and expects to be confined therein for at least another couple of weeks. Don is anxious to see as many of his old friends as possible. Hut 19 is the QTH.

Mr. Keith Burbury of the Radio Inspector's Office Sydney was recently promoted to the post of Radio Inspector, Hobart. Keith, whilst in Sydney acted as Chairman of the Vigilance Committee of this State and his strict impartiality and attention to detail went a long way towards the efficient working of the Committee. Mr. Burbury was made a presentation of a desk calendar suitably inscribed, by the Institute as token of appreciation of the work performed by him.

The Election of the Federal Executive was held at the August Meeting and resulted as follows:-

Federal President	-- R. A. Priddle	VK2FA
Federal Vice President	-- A. Joscelynce	2AJ0
Federal Secretary	-- W. G. Ryan	VK2TI
Councillors	-- H. Peterson	VK2HP
	W. McElrea	VK2UV

With the exception of Federal President, Office Bearers were elected unopposed. Two nominations were received for Federal President Messrs. Corbin 2YC, and Priddle 2RA, 2RA winning the ballot.

Recently the Vigilance Committee discussed the operations of shortwave Broadcasting Stations operating in the 7 mc band, particularly between 7000 and 7200 kcs. In a number of cases these stations were operated by the B.B.C. and a communication received from the R.S.C.B. states that this body also took the matter up with the P.M.G. (England) and they have received an assurance that this is only a wartime measure and these frequencies will be immediately vacated once the necessity for their use is past.

The next meeting of the Division will be held at Y.M.C.A. Buildings, Pitt Street, Sydney on Thursday 18th September at 8 p.m., and a cordial invitation to be present is extended to all hams.

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-- THE NEW FEDERAL EXECUTIVE -- -----

For the next two years Federal Headquarters will be located in New South Wales and the Election of that Executive was completed at the August General Meeting, and herewith a short sketch of each Member.

The Federal President, Ray Priddle VK2RA. Ray, a comparatively young man in years is quite an old-timer as far as Amateur Radio is concerned, obtained his ticket in 1929, but had to wait several months until he "came of age" before he could go on the air. Started off with the usual Hartley and Dot and 1. Progressed through the various stages right up to an 808 crystal control and then e.c. Receiver those days is a McMurdo-Silver, a 10 tube affair. Ray's activities on the air have been many and varied. Always keen on a rag chow, Dx, and multi band operation 2RA has worked 85 Countries, 35 Zones is W.A.C. and W.A.S. and is one of the few VK holders of the British Empire Radio Transmission Award. Was a member of the Divisional Council several years ago, occupying the position of Magazine Manager and later Vice President. Resigned from the Divisional Council upon the receipt of a commission in the 18th Field Brigade. Was recently promoted to rank of Captain and Battery Commander, but as he is a Structural Engineer by profession, was recently placed on the Reserve of Officers and once more his services are available to the Institute.

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Meeting Night—First Tuesday in each month.

**THE WIRELESS INSTITUTE
OF AUSTRALIA
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VK2NG; R. SMITH, VK2AIU; R. MILLER.

The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

H A M S !

**DO YOU WANT TO BE
BACK ON THE AIR?**



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OF AUSTRALIA**

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EVERY ACTIVE HAM

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